THE UNIVERSITY OF UTAH

August 27, 2013

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

To whom it may concern:

Enclosed please find the Annual Operating Report for the University of Utah TRIGA Nuclear Reactor, License No. R-126, Docket number 50-407, for the period of 1 July 2012 through 30 June 2013. This report fulfills the requirements of the TRIGA Technical Specifications 6.7.1.

If there are any further questions or concerns regarding this report, please contact me at (801) 587-9696.

Respectfully,

Tatjana Jevremovic, Ph.D.
Director

Nuclear Engineering Program
50 S. Central Campus Dr. Rm. 1206
Salt Lake City, Utah 84112-8917
(801) 581-4188
FAX: (801) 585-5477
www.nuclear.utah.edu

A020
NRR

The University of Utah TRIGA Reactor (UUTR)

Annual Operating Report

for the period
1 July 2012 through 30 June 2013

Gregory Moffitt, UUTR Supervisor
Dr. Tatjana Jevremovic, UNEP & UUTR Director

A. NARRATIVE

1. Operating Experience

The University of Utah TRIGA Reactor (UUTR), License No. R-126, Docket No. 50-407, was critical for 51.594 hours and generated 2289.763 kilowatt-hours of thermal energy during this reporting year. The reactor was used for educational demonstrations and training, laboratory experiments, reactor systems tests, reactor power measurements and samples irradiations.

2. Changes in Facility Design

The facility and associated laboratories were upgraded by adding new germanium gamma detectors in room 1205.

3. Surveillance Tests

Documentation of all surveillance activities is retained and stored by the facility.

a. Control Rod Worth

Table 1. Summary of control rod worth, SDM, and ER

Core Configuration Date	#24-B 08/17/12	#24-B 2/22/13
	Worth ($)	Worth ($)
Safety Rod	2.320	2.253
Shim Rod	1.493	1.487
Regulating Rod	0.277	0.273
Excess Reactivity	0.792	0.756
Shutdown Margin	0.978	1.004

b. Control Rod Inspection

The biennial control rod inspection was performed during December of 2011 and was not required to be performed in 2012.

c. Reactor Power Level Instrumentation

Calorimetric power calibrations were performed on 8/17/12, and 2/27/13 with the results shown in Table 2.

Table 2. Summary of calorimetric power calibration

Date	Measured % Power	Calculated Power Level
08/17/12	93.5	87.62
02/27/13	93.0	93.67

d. Fuel Inspection

The biennial fuel inspection was performed during December of 2011 and was not required to be performed in 2012.

e. Fuel Temperature Calibration

Fuel temperature circuits were calibrated on 08/24/12 and 02/21/13. The circuits were calibrated to less than or equal a 2°C error over the range from 20 °C to 400 °C.

f. Reactor Safety Committee (RSC) Audits

Four RSC audits were completed during this reporting period. The data are shown in Table 3. No significant deviations from normal operating practices were identified by these audits.

Table 3. Audit summary

Audit	Period	Auditor
Operation and Maintenance	1 Jan. 2013 to 30 Jun. 2013	James R. Parry/INL
Radiation Safety and ALARA	1 Jan. 2013 to 30 Jun. 2013	James R. Parry/INL
Operation and Maintenance	1 Jul. 2012 to 31 Dec. 2012	James R. Parry/INL
Radiation Safety and ALARA	1 Jul. 2012 to 31 Dec. 2012	James R. Parry/INL

g. Environmental Surveys

Nine environmental monitors are located in the areas surrounding the UUTR. A maximum exposure of 54 mrem in a quarter to an environmental dosimeter located in the building #80 was measured. Table 4 shows the average dose recorded in last five years.

Table 4. Summary of environmental monitoring around the UUTR

Year	Average quarterly readings for the 9 environmental monitors (mrem)
2012	35.56
2011	35.13
2010	36.00
2009	34.56
2008	39.26
2007	37.94

B. ENERGY OUTPUT

The UUTR reactor was critical for 51.594 hours and produced 0.0954 megawatt·days (2289.763kilowatt·hours) of energy during this reporting period. Since initial criticality, the reactor has been operated for a total of 3,699.954 hours with an accumulated total energy output of 9.129 megawatt·days (219,088.927 kilowatt·hours).

C. EMERGENCY SHUTDOWNS AND INADVERTENT SCRAMS:

There were six inadvertent SCRAMs occurred during this period: 12/13/12, 02/27/13, 03/08/12, 04/12/13, and 06/28/13 because of feedback from mechanical errors of the pool water scram switch. There were no emergency shutdowns. Summary of the inadvertent scrams is given in Table 5.

Table 5. Summary of Inadvertent SCRAMS

Date	Run Number	Type	Cause	Action
12/13/12	1798	Pool water	Pool water scram switch-Feedback from the pool water scram switch	Reset pool water scram
02/27/13	1807	Pool water	Pool water scram switch-Feedback from the pool water scram switch	Reset pool water scram
03/08/13	1809	Pool water	Pool water scram switch-Feedback from the pool water scram switch	Reset pool water scram
04/12/13	1811	Pool water	Pool water scram switch-Feedback from the pool water scram switch	Reset pool water scram

06/28/13	1813	Pool water	Pool water scram switch-Feedback from the pool water scram switch	Replaced momentary switches on pool water scram

D. MAJOR MAINTENANCE

None.

E. CHANGES, TESTS AND EXPERIMENTS PURSUANT TO 10 CFR 50.59

None.

F. REACTOR SAFETY COMMITTEE

As of the end of the reporting period, the current members of the RSC as designated by the Licensee are as follows:

James M. Byrne, Chair
Tatjana Jevremovic, Director UNEP and UUTR
Karen Langley, RSO of University of Utah
Greg Moffitt, Reactor Supervisor
Gary M. Sandquist
Robert J. Huber
James Thompson
James R. Parry
Chris Pantelides
Rian B. Smith

The UNEP staff continues to review and update facility documentation to assure compliance with all applicable regulations.

G. RADIOACTIVE EFFLUENTS

1. Liquid Waste

Total activity released: none

2. Gaseous Waste

Total estimated activity released: 28.516 μCi.
The UUTR was operated for 51.594 hours at power levels up to approximately 90 kW. At this power level Ar-41 production is substantially below MPC values for unrestricted areas. The minimum detectable concentration of Ar-41 from the CAM system for the stack

monitor has been found to be less than two-third of 10 CFR 20 appendix B limits for release to unrestricted areas. The average annual calculated concentration of Ar-41 generated during operation is estimated to be1.269×10^{-10} μCi/ml that is approximately 0.008 % of the DAC. The total amount of Ar-41 released was estimated to be28.516 μCi. No phosphorus-32 was released from the UUTR and associated facilities during this period. The total amount of all gaseous radioactivity released was estimated to be 28.516 μCi. A monthly summary of gaseous releases is given in Table 6. Total activity of gaseous effluent was therefore28.516 μCi.

Table 6. Summary of Monthly Gaseous Radioactive Effluent

Month	Power (kWh)	Ar-41 (μCi)	Ar-41 (μCi/ml)	Estimated Release P-32 and all others	% of DAC
Jul.12	263	3.270	1.455×10^{-11}	0	0.000
Aug 12	389	4.839	2.153×10^{-11}	0	0.001
Sep 12	146	1.816	8.079×10^{-12}	0	0.000
Oct 12	0	0.000	0	0	0.000
Nov 12	557	6.935	3.085×10^{-11}	0	0.001
Dec 12	90	1.126	5.010×10^{-12}	0	0.000
Jan 13	201	2.509	1.116×10^{-11}	0	0.000
Feb 13	193	2.410	1.072×10^{-11}	0	0.000
Mar 13	234	2.914	1.296×10^{-11}	0	0.000
Apr 13	180	2.241	9.968×10^{-12}	0	0.000
May 13	19	0.236	1.049×10^{-12}	0	0.000
Jun 13	18	0.222	9.857×10^{-13}	0	0.000
Total	**2290**	**28.516**	**1.269×10^{-10}**	**0**	**0.004**

3. Solid Waste - Total activity: None
   No solid waste material was sent to the Radiological Health Department for disposal during the period of 1 July 2012 through 30 June 2013.

H. PERSONNEL RADIATION EXPOSURES

UNEP Personnel

The University of Utah Radiological Health Department has issued to all personnel with duties in the reactor laboratory on either a regular or occasional basis an OSL dosimeter. The duty category and monitoring period of personnel are summarized in Table 7. A summary of the whole body exposures to the UNEP personnel is presented in Table 8.

Measured Doses

7/1/12-6/30/13 Doses: <4 mrem average; 58 mrem highest measured

Dose Equivalent Limit
Maximum Permissible Dose Equivalent = 5000 mrem/year (1250/quarter).
Minimum Detectable Dose per Monthly Badge = 1 mrem.

Visitors
Five hundred and eight-nine (589) individuals visited the reactor facility during the period 1 July 2012 to 30 June 2013. None of the visitors received a measurable dose.

Table 7. Summary of Monitored Personnel

Name	Monitoring Period	Duty Category
Dong-ok Choe	07/01/12-6/30/13	Regular/Terminated
Jorge Navarro	07/01/12-6/30/13	Regular
Zachary Heinz	07/01/12-2/28/13	Regular/Terminated
Gregory Moffitt	07/01/12-6/30/13	Regular
Jesse Reeves	07/01/12-6/30/13	Regular
Tatjana Jevremovic	07/01/12-6/30/13	Regular
Aliaksei Minko	07/01/12-6/30/13	Regular
Todd Sherman	07/01/12-4/30/13	Regular/Terminated
Andrew Voyles	07/01/12-2/28/13	Regular/Terminated
Haori Yang	07/01/12-6/30/13	Regular
Joseph Levinthal	07/01/12-3/31/13	Regular/Terminated
Ian Schwerdt	07/01/12-3/31/13	Regular/Terminated
Christopher Dances	07/01/12-6/30/13	Regular/Terminated
Hermilo Hernandez	07/01/12-6/30/13	Regular
Jason Rapich	07/01/12-6/30/13	Regular
Steven Burnham	07/01/12-6/30/13	Regular
Daniel Telenko	07/01/12-4/30/13	Regular/Terminated
Philip Babitz	07/01/12-6/30/13	Regular
Avdo Cutic	07/01/12-6/30/13	Regular
Jennifer Gibson	07/01/12-6/30/13	Regular
Brooklyn Noble	07/01/12-6/30/13	Regular
Andrey Rybalkin	07/01/12-2/28/13	Regular/Terminated

Christian Adjei	07/01/12-6/30/13	Regular
Dallon Boyd	07/01/12-6/30/13	Regular
Samuel Brown	07/01/12-6/30/13	Regular
Tierra Duffield	07/01/12-6/30/13	Regular
Mark Young	07/01/12-12/31/12	Regular/Terminated
Samantha Winkle	07/01/12-6/30/13	Regular
Blane Wilkinson	07/01/12-6/30/13	Regular
Can Liao	07/01/12-6/30/13	Regular
Kamala Ganesh	09/01/12-12/31/12	Regular/Terminated
Mahatasin Azad	09/01-12-11/30/12	Regular/Terminated
Lyman Owen	10/01/12-06/30/13	Regular
Tristalee Williams	11/01/12-06/30/13	Regular
Xianfei Wen	11/01/12-06/30/13	Regular
Matthew Lund	11/01/12-06/30/13	Regular
David Morgan	11/01/12-06/30/13	Regular
John Kavouras	11/01/12-06/30/13	Regular
Victor Bautista	11/01/12-06/30/13	Regular
Kaylyn McCoy	11/01/12-06/30/13	Regular
Vijay Varun	11/01/12-06/30/13	Regular
Joseph Santora	11/01/12-06/30/13	Regular
Miltiadis Alamaniotis	12/01/12-06/30/13	Regular
Stefan Badza	01/01/13-06/30/13	Regular
Christopher Cosman	03/01/13-05/31/13	Regular/Terminated
Elton Jasaraj	03/01/13-06/30/13	Regular

Table 8. Summary of whole body exposures to the UNEP personnel

Estimated whole body exposure range (rem)	Number of individuals in each range
Less than 0.1	46
0.10 to 0.25	0
0.25 to 0.50	0
0.50 to 0.75	0
0.75 to 1.00	0
1.00 to 2.00	0
2.00 to 3.00	0
3.00 to 4.00	0
4.00 to 5.00	0
Greater than 5 rem	0

I. LABORATORY SURVEYS

Monthly surveys of the facility were conducted by the University of Utah Radiological Health Department during the reporting period. The surveys have not indicated any unusual radiation levels over previous years. Records of surveys are retained by the facility.

J. ENVIRONMENTAL STUDIES

Environmental monitoring conducted by the University of Utah Radiological Health Department indicated no unusual dose rates in the areas surrounding the Merrill Engineering Building, which houses the UUTR reactor facility.

Prepared by: Gregory Moffitt Date: 8/15/2013
Reactor Supervisor

Submitted by: Gregory Moffitt Date: 8/15/2013
Reactor Supervisor

Approved by: Tatjana Jevremovic Date: 8/23/2016
Director